
SECTION 08410 - ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior storefront systems.
 - 2. Interior storefront systems.
- B. Related sections include the following:
 - 1. Division 7 Section "Joint Sealants" for joint sealants installed as part of aluminum entrance and storefront systems.
 - 2. Division 8 Section "Glazing."

1.3 SYSTEM DESCRIPTION

- A. General: Provide aluminum entrance and storefront systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:
 - 1. Air infiltration and water penetration exceeding specified limits.
 - 2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.
- B. Glazing: Physically and thermally isolate glazing from framing members.
- C. Thermally Broken Construction: Provide systems that isolate aluminum exposed to exterior from aluminum exposed to interior with a material of low thermal conductance.
- D. Wind Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to



requirements of the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure."

1. Deflection of framing members in a direction normal to wall plane is limited to 1/175 of clear span or 3/4 inch (19 mm), whichever is smaller, unless otherwise indicated.
 2. Static-Pressure Test Performance: Provide entrance and storefront systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.
 - a. Test Pressure: 150 percent of inward and outward wind-load design pressures.
 - b. Duration: As required by design wind velocity; fastest 1 mile (1.609 km) of wind for relevant exposure category.
- E. Seismic Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding the effects of earthquake motions calculated according to requirements of ASCE 7, "Minimum Design Loads for Buildings and Other Structures," Section 9, "Earthquake Loads."
- F. Dead Loads: Provide entrance- and storefront-system members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimension when carrying full dead load.
1. Provide a minimum 1/8-inch (3.18-mm) clearance between members and top of glazing or other fixed part immediately below.
 2. Provide a minimum 1/16-inch (1.59-mm) clearance between members and operable windows and doors.
- G. Live Loads: Provide entrance and storefront systems, including anchorage, that accommodate the supporting structures' deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.
- H. Air Infiltration: Provide entrance and storefront systems with permanent resistance to air leakage through fixed glazing and frame areas of not more than

0.06 cfm/sq. ft. (0.3 L/s/sq. m) of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft. (75.2 Pa).

- I. Water Penetration: Provide entrance and storefront systems that do not evidence water leakage through fixed glazing and frame areas when tested according to ASTM E 331 at minimum differential pressure of 20 percent of inward-acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 6.24 lbf/sq. ft. (299 Pa). Water leakage is defined as follows:
 - 1. Uncontrolled water infiltrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.
- J. Thermal Movements: Provide entrance and storefront systems, including anchorage, that accommodate thermal movements of systems and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, failure of doors or other operating units to function properly, and other detrimental effects.
 - 1. Temperature Change (Range): 200 degrees F (93 degrees C), ambient; 220 degrees F (104 degrees C), material surfaces.
- K. Structural-Support Movement: Provide entrance and storefront systems that accommodate structural movements including, but not limited to, sway and deflection.
- L. Condensation Resistance: Provide storefront systems with condensation resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.1.
- M. Average Thermal Conductance: Provide storefront systems with average U-values of not more than 0.63 Btu/sq. ft. x h x degrees F (3.57 W/sq. m x K) when tested according to AAMA 1503.1.
- N. Dimensional Tolerances: Provide entrance and storefront systems that accommodate dimensional tolerances of building frame and other adjacent construction.



1.4 SUBMITTALS

- A. Product Data: For each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, finishes, and fire-rating.
- B. Shop Drawings: For entrance and storefront systems. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.
 - 1. For entrance systems, include hardware schedule and indicate operating hardware types, quantities, and locations.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.
- D. Samples for Verification: Of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
- E. Cutaway Sample: Of each vertical-to-horizontal framing intersection of systems, made from minimum 6-inch (150-mm) lengths of full-size components and showing details of the following:
- F. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- G. Sealant Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating that materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with sealants; include joint sealant manufacturers' written interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.
- H. Product Test Reports: Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of entrance and storefront systems with requirements based on comprehensive testing of current systems.



1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing entrance and storefront systems similar to those required for this Project and who is acceptable to manufacturer.
 - 1. Engineering Responsibility: Prepare data for entrance and storefront systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Source Limitations: Obtain each type of entrance and storefront system through one source from a single manufacturer.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of entrance and storefront systems and are based on the specific systems indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."
 - 1. Do not modify intended aesthetic effect, except with Owner's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Owner for review.
- D. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code--Aluminum."

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with,



other warranties made by the Contractor under requirements of the Contract Documents.

- B. Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of entrance and storefront systems that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to:
1. Structural failures including, but not limited to, excessive deflection.
 2. Failure of system to meet performance requirements.
 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 4. Failure of operating components to function normally.
 5. Water leakage through fixed glazing and frame areas.
- C. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to:
1. EFCO Corporation.
 2. International Aluminum Corporation; U.S. Aluminum.
 3. Kawneer Company, Inc.
 4. Avalon International Aluminum; Dual Lock Partition Systems, Inc.

2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.
1. Sheet and Plate: **ASTM B 209** (ASTM B 209M).
 2. Extruded Bars, Rods, Shapes, and Tubes: **ASTM B 221** (ASTM B 221M).
 3. Extruded Structural Pipe and Tubes: ASTM B 429.

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4. Bars, Rods, and Wire: **ASTM B 211** (**ASTM B 211M**).
 5. Welding Rods and Bare Electrodes: AWS A5.10.
- B. Steel Reinforcement: Complying with **ASTM A 36** (**ASTM A 36M**) for structural shapes, plates, and bars; ASTM A 611 for cold-rolled sheet and strip; or **ASTM A 570** (**ASTM A 570M**) for hot-rolled sheet and strip.
 - C. Verify that the Section title listed below is correct for this Project's Specifications.
 - D. Glazing as specified in Division 8 Section "Glazing."
 - E. Glazing Gaskets: Manufacturer's standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers, fabricated from an elastomer of type and in hardness recommended by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.
 - F. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.
 - G. Sealants and joint fillers for joints at perimeter of entrance and storefront systems as specified in Division 7 Section "Joint Sealants."
 - H. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for **30-mil** (**0.8-mm**) thickness per coat.
- 2.3 COMPONENTS
- A. Doors: Provide manufacturer's standard **1-3/4-inch-** (**45-mm-**) thick glazed doors with minimum **0.125-inch-** (**3-mm-**) thick, extruded tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods.
 1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets.
 2. Stile Design: Narrow stile; **2-inch** (**50-mm**) nominal width.



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- B. Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials. Provide non-staining, nonferrous shims for aligning system components.
 - C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
 - 1. Reinforce members as required to retain fastener threads.
 - 2. Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.
 - D. Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.
 - E. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing, compatible with adjacent materials, and of type recommended by manufacturer.
 - F. Weather Stripping: Manufacturer's standard replaceable weather stripping as follows:
 - 1. Compression Weather Stripping: Molded neoprene complying with ASTM D 2000 requirements or molded PVC complying with ASTM D 2287 requirements.

2.4 HARDWARE

- A. General: Provide heavy-duty hardware units indicated in sizes, number, and type recommended by manufacturer for entrances indicated. Finish exposed parts to match door finish, unless otherwise indicated.
- B. Offset Pivots: ANSI/BHMA A156.4, Grade 1 with exposed parts of cast-aluminum alloy. Provide top, bottom, and intermediate pivots at each door leaf.
- C. Ball-Bearing Butts: ANSI/BHMA A156.1, Grade 1, 5-knuckle, 4-1/2-by-4-inch (113-by-100-mm) ball-bearing butts. Provide non-removable pins at hinges exposed to door outside and provide nonferrous hinges for applications ex-



posed to weather. Provide 3 hinges at each leaf for doors up to 36 inches (900 mm) wide and 80 inches (2050 mm) tall; provide 4 hinges at each leaf for taller doors.

- D. Closers, General: Comply with manufacturer's recommendations for closer size, depending on door size, exposure to weather, and anticipated frequency of use.
 - 1. Closing Cycle: Comply with requirements of the Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)."
 - 2. Opening Force: Comply with the following maximum opening-force requirements for locations indicated:
 - a. Exterior Doors: 15 lbf (67 N).
 - b. Interior Doors: 5 lbf (22 N).
- E. Concealed Overhead Closers: ANSI/BHMA 156.4, Grade 2, and as follows:
 - 1. Type: Single acting, independently hung, with concealed arm and track.
 - 2. Hold Open: Automatic, at angle selected from manufacturer's standard options.
 - 3. Back Check: Adjustable.
 - 4. Positive Dead Stop: Coordinated with hold-open angle, if any, or at angle selected by Architect from manufacturer's standard options.
- F. Concealed Overhead Holders: ANSI/BHMA A156.8, Grade 1, adjustable, shock-absorbing type, for use with single- or double-acting doors.
- G. Door Stops: ANSI/BHMA A156.16, Grade 1, floor- or wall-mounted door stop, as appropriate for door location indicated, with integral rubber bumper.
- H. Cylinders: Keyed to match the building's other doors.
- I. Mortise Cylinders: Manufacturer's standard, 6-pin, mortised cylinders complying with ANSI/BHMA A156.5, Grade 1 requirements.
 - 1. Provide inside and outside mortise cylinders.
- J. Cylinder Guard: Manufacturer's standard hardened-steel security ring with retainer plate for inside stile wall that protects lock cylinder from removal by wrenches, prying, or sawing.



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- K. Deadlock: Manufacturer's standard mortise deadlock with minimum 1-inch- (25-mm-) long throw bolt and complying with ANSI/BHMA A156.5, Grade 1 requirements.
 - 1. Three-Point Locking: Provide top and bottom bolts and mechanism that automatically throws inactive-leaf top bolt into frame head and active-leaf bottom bolt into threshold when deadlock engages inactive leaf and provides one-stage unlocking.
 - L. Hook-Bolt Locks: Manufacturer's standard mortise hook bolt with 5-ply laminated steel, hook-shaped throw bolt, and complying with ANSI/BHMA A156.5, Grade 1 requirements.
 - M. Lockset Faceplates: Manufacturer's standard extruded-aluminum faceplate for lock type indicated that lays flush with door stile.
 - 1. Provide radiused faceplate with weather sweep extending full length of lock at meeting stiles of pairs of doors.
 - N. Flat Face Strikes: Manufacturer's standard stainless-steel, flat face strike with steel mounting plate and black-plastic dustbox.
 - O. Pull Handles: As selected from manufacturer's full range of pull handles and plates.
 - P. Push Bars: As selected from manufacturer's full range of full-door-width, single-bar push bars. Provide push plate affixed to push bar.
 - Q. Thresholds: At exterior doors, provide manufacturer's standard threshold with cutouts coordinated for operating hardware, with anchors and jamb clips, and not more than 1/2-inch- (13-mm-) high, with beveled edges providing a floor level change with a slope of not more than 1:2, and in the following material:
 - 1. Material: Aluminum, mill finish.
 - R. Weather Sweeps: Manufacturer's standard weather sweep for application to exterior door bottoms and with concealed fasteners on mounting strips.

2.5 FABRICATION



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- A. General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
 - B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
 - C. Prepare components to receive concealed fasteners and anchor and connection devices.
 - D. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
 - E. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
 - F. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual."
 - G. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
 - H. Storefront: Fabricate framing in profiles indicated. Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.
 - I. Entrances: Fabricate door framing in profiles indicated. Reinforce as required to support imposed loads. Factory assemble door and frame units and factory install hardware to greatest extent possible. Reinforce door and frame units as required for installing hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.
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1. Exterior Doors: Provide compression weather stripping at fixed stops. At other locations, provide sliding weather stripping retained in adjustable strip mortised into door edge.
2. Interior Doors: Provide ANSI/BHMA A156.16 silencers at stops to prevent metal to metal contact. Provide 3 silencers on strike jamb of single-door frames and 2 silencers on head of double-door frames.

2.6 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- D. High-Performance Organic Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.
 1. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermo-cured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.
 - a. Color and Gloss: As selected from manufacturer's full range of choices for color and gloss.

2.7 STEEL PRIMING

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- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying primer.
 - B. Surface Preparation: Perform manufacturer's standard cleaning operations to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel.
 - C. Priming: Apply manufacturer's standard corrosion-resistant primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of entrance and storefront systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions for protecting, handling, and installing entrance and storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints. Seal joints watertight.
- B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- D. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated.



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- E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.
 - F. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.
 - G. Install glazing to comply with requirements of Division 8 Section "Glazing," unless otherwise indicated.
 - H. Install perimeter sealant to comply with requirements of Division 7 Section "Joint Sealants," unless otherwise indicated.
 - I. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances:
 - 1. Variation from Plane: Limit variation from plane or location shown to **1/8 inch in 12 feet (3 mm in 3600 mm); 1/4 inch (6 mm)** over total length.
 - 2. Alignment: Where surfaces abut in line, limit offset from true alignment to **1/16 inch (2 mm)**. Where surfaces meet at corners, limit offset from true alignment to **1/32 inch (1 mm)**.
 - 3. Diagonal Measurements: Limit difference between diagonal measurements to **1/8 inch (3 mm)**.

3.3 ADJUSTING AND CLEANING

- A. Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weathertight closure.
- B. Remove excess sealant and glazing compounds, and dirt from surfaces.

3.4 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure entrance and storefront systems are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08410